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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/871,063	05/31/2001	David L. Barron	SC11447ZC	8966

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MOTOROLA, INC.
CORPORATE LAW DEPARTMENT - #56-238
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EXAMINER

NOLAN, DANIEL A

ART UNIT PAPER NUMBER

2654

DATE MAILED: 02/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/871,063

Applicant(s)

BARRON ET AL.

Examiner

Daniel A. Nolan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 May 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-10 is/are rejected.
- 7) ☒ Claim(s) 2 and 11 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 May 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The disclosure is objected to because the word "Viterbi" is misspelled throughout the Disclosure. Appropriate correction is required.

2. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

- Claim 5 contains the further limitation for "a specific language", the particulars of which are not mentioned in the disclosure.

The Examiner is proceeding with the understanding that any language employing speech (page 3 line 5, page 4 line 17).

- Claims 5, 7, 8, 9 and 10 refer to "higher-order vectors". There is nothing in the disclosure that would provide a basis for such quantization.

While "high order vectors" are mentioned in the disclosure (page 2 line 19, page 3 line 1, page 5 line 27, page 6 line 11), any specification that would distinguish the "first higher-order vectors" from other vectors is not provided in the disclosure.

The Examiner is proceeding with the understanding that the distinction applied to the vectors is not needed for the invention and may be disregarded as a criteria.

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- Claims 6 and 7 refer to "*4th order vectors*" which are not mentioned in the specification.

The Examiner is proceeding with the understanding that the term refers to "*4th order polynomials*".

- Claims 8 and 9 refer to "*single command vector*" which is not stipulated in the specification.

The Examiner is proceeding with the understanding that the term refers to any vector pertaining to the subject speech.

Drawings

3. The drawings are objected to because:

- "Viterbi" is misspelled (26 figure 1).
- "processing" is misspelled (46 in figure 2).

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because reference signs 62-82 (in figure 3) are not specified.

A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the

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Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

5. Claim 2 is objected to because of the informality that "Viterbi" is misspelled.

Appropriate correction is required.

6. The Examiner has noted the following anomaly and requests confirmation that the claims in the application are intended to be as stated and consideration of the suggestion for remedy:

- In claims 1-4, the 1st vectors are for "training" and the 2nd vectors are for "non-training".
- In claims 5-9 and 10-11, the opposite is the case, with the 1st vectors designated as "non-training" and the 2nd vectors as "training".
- While the claims are being examined *verbatim*, it is suggested that arranging the claims (and their appropriate dependent claims) so that the terms and designations agree, to avoid future misadventures and problems arising from errors of understanding.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Campbell et al⁰⁸⁹

8. Claims 1 and 10 are rejected under 35 U.S.C. 102(a) as being anticipated by Campbell et al⁰⁸⁹ (U.S. Patent 6,131,089 A).

9. Regarding claim 1, Campbell et al⁰⁸⁹ read on every feature of the claim for a *speech recognition system* with the invention for a *pattern classifier with training system* as follows:

- Campbell et al⁰⁸⁹ (101→217→201 in figure 2) read on the feature of the claim for a *1st (non-training) section having an input for receiving a spoken command* (101 in figure 2) *and providing a polynomial expansion* (claim 21 line 42) *of a feature vector* (column 3 lines 5-13) *generated for the spoken command in a non-training mode;*
- Campbell et al⁰⁸⁹ (101→104→107 in figure 1) read on the feature of the claim for a *2nd (training) section that provides a polynomial expansion of a feature vector generated in a training mode; and*

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- Campbell et al⁰⁸⁹ (440 in figure 4) read on the feature of the claim for a 3rd section having a correlator block (shown as 103 figure 1→103→215 figure 2) that correlates the polynomial expansion of the feature vector from the 1st (non-training) section (217→205/208→ 103→212→105 in figure 2) with the polynomial expansion of the feature vector from the 2nd (training) section (107 in figure 1), wherein the 3rd section performs a Hidden Markov Model statistical analysis of a correlated feature vector (column 5 lines 14-17).

10. Regarding claim 10 as understood by the Examiner, Campbell et al⁰⁸⁹ read on every feature of the claim for *identifying a spoken command* as follows:

- Campbell et al⁰⁸⁹ (101→104→107 in figure 1) read on the feature for *providing a training mode for sampling speech that includes, extracting a 1st* (training) set of feature vectors from the sampled speech (column 3 lines 5-13), *generating a polynomial expansion of the 1st* (training) set of feature vectors (320 in figure 3), and *quantizing the polynomial expansion* (325 in figure 3);
- Campbell et al⁰⁸⁹ (101→217→201 in figure 2) read on the feature for *providing a non-training mode for a speech input that includes, extracting a 2nd* (non-training) set of feature vectors from the speech input (410 in figure 4), and *generating a polynomial expansion of the 2nd* (non-training) set of feature vectors (claim 21 line 42);
- Campbell et al⁰⁸⁹ (440 in figure 4) read on the feature for *correlating the 1st* (training) higher-order vectors generated in the *training mode* (shown as 103 figure

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- 1→103→215 figure 2) with the 2nd (non-training) higher-order vectors generated from the spoken command in the non-training mode (107 in figure 1);
- and providing a statistical analysis based on a Hidden Markov Model to identify the spoken command.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Campbell et al.^{'653} & Campbell et al.^{'089}

13. Claims 1 and 3-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Campbell et al.^{'653} (U.S. Patent 5,946,653 A) in view of Campbell et al.^{'089}.

14. Regarding claim 1, Campbell et al.^{'653} reads on the features of the claim for a *speech recognition system* with the invention for *speaker independent speech recognition* as follows:

- Campbell et al.^{'653} (200-220 in figure 2) reads on the feature of the claim for a 1st (non-training) *section having an input for receiving a spoken command* (202 in figure 2) and *providing a polynomial expansion* (208 in figure 2) of a feature vector (204 in figure 2) *generated for the spoken command in a non-training mode*;
- Campbell et al.^{'653} (100→128 in figure 1) reads on the feature of the claim for a 2nd (training) *section that provides a polynomial expansion* (108 in figure 1) of a feature vector *generated in a training mode* (104 in figure 1); and
- Campbell et al.^{'653} (300 in figure 3 – see column 10 lines 16-41) reads on the feature of the claim for a 3rd *section having a correlator block* (316 in figure 3 – see column 10 lines 16-22) *that correlates the polynomial expansion of the feature vector from the 1st (non-training) section* (318 in figure 3 – see column 10 lines 34-37) *with the polynomial expansion of the feature vector from the 2nd (training) section*.

Campbell et al.^{'653} does not mention HMM. Campbell et al.^{'089} reads on the feature that *the 3rd section performs a Hidden Markov Model statistical analysis of a*

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correlated feature vector (column 5 lines 14-17). It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Campbell et al^{'089} to the device/method of Campbell et al^{'653} to use "states" to increase the probability of recognizing a sound (as being a word).

15. Regarding claim 3, the claim is set forth with the same limits as claim 1.

Campbell et al^{'653} read on the features of a *sampler block having an input for receiving the spoken command* (302 in figure 3) with a *feature extractor having an input coupled to an output of the sampler block* (304 in figure 3) and a *polynomial expansion block* (208 in figure 2) *having an input coupled to the feature extractor* (206 in figure 2) and an *output that provides the polynomial expansion* (210 in figure 2) *of the feature vector generated for the spoken command*.

16. Regarding claim 4, the claim is set forth with the same limits as claim 1.

Campbell et al^{'653} read on the features that *the 2nd* (training) *section further includes a feature vector generator* (306 in figure 3 – see column 10 lines 8-9), a *polynomial expansion block having an input coupled to the feature vector generator* (108 in figure 1), a *vector quantizer block having an input coupled to an output of the polynomial expansion block* (110 in figure 1); and a *processing block having an input coupled to an output of the vector quantizer block* (312/316→318 in figure 3) and an *output that provides the polynomial expansion* (12 in figure 3) *of the feature vector generated in the training mode* (column 10 line 6).

17. Regarding claim 5 as understood by the Examiner, Campbell et al⁶⁵³ read on the features of the claim for *identifying a spoken command* as follows:

- Campbell et al⁶⁵³ read on the feature for *generating speech building blocks in a training mode* (104 in figure 1 – see column 10 line 6) *by providing a polynomial expansion of 1st (training) vectors* (108 in figure 1);
- Campbell et al⁶⁵³ read on the feature for *generating 2nd (non-training) vectors from a speech input in a non-training mode* (206 in figure 2);
- Campbell et al⁶⁵³ read on the feature for *correlating the 1st (training) vectors generated in the training mode* (column 10 lines 16-23) *with the 2nd (non-training) vectors generated from the spoken command in the non-training mode* (212-216 in figure 2);
- *and generating a statistical analysis based on a Hidden Markov Model to identify the spoken command.*

Campbell et al⁶⁵³ does not mention HMM. Campbell et al⁰⁸⁹ reads on the feature that *the 3rd section performs a Hidden Markov Model statistical analysis of a correlated feature vector* (column 5 lines 14-17). It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Campbell et al⁰⁸⁹ to the device/method of Campbell et al⁶⁵³ to use “states” to increase the probability of recognizing a certain sound (as being a word).

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18. Regarding claim 6 as understood by the Examiner, the claim is set forth with the same limits as claim 5. Campbell et al⁶⁵³ read on the feature for *expanding the recognizer's vocabulary into a set of at least 4th order vectors in the training mode* (column 4 lines 23-24).

19. Regarding claim 7 as understood by the Examiner, the claim is set forth with the same limits as claim 5. Campbell et al⁶⁵³ read on the feature that *generating the vectors from a speech input in a non-training mode includes generating at least 4th order vectors* (claim 16 lines 25-32).

20. Regarding claim 8 as understood by the Examiner, the claim is set forth with the same limits as claim 5. Campbell et al⁶⁵³ read on the feature that *generating speech building blocks in a training mode includes quantizing the 1st (training) vectors to create a vector for the spoken command (306 in figure 3) and processing the vector to provide the speech building blocks (306→316 in figure 3).*

21. Regarding claim 9 as understood by the Examiner, the claim is set forth with the same limits as claim 5. Campbell et al⁶⁵³ read on the feature that *generating 2nd (training) vectors includes representing the spoken command by a plurality of spoken feature vectors (304 in figure 3); summing the plurality of spoken feature vectors to create a vector for the spoken command (306→310 in figure 3); and generating a polynomial expansion of the vector (310→312 in figure 3).*

Allowable Subject Matter

22. Claims 2 and 9 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

23. The following is a statement of reasons for the indication of allowable subject matter:

- The present invention is directed to *mathematically recognizing speech*.
- Claim 2 identifies the uniquely distinct feature that *the 3rd section* (during recognition) *includes "a sequence vector block having an input for receiving a signal from the correlator block, an HMM table having an output; and a Viterbi block having a 1st (non-training) input coupled to the sequence vector block, a 2nd (training) input coupled to the HMM table, and an output that provides a state sequence that maximizes a probability of identifying the spoken command."*

The closest prior art, Huang et al, (column 12 lines 1-7, 17-20 and 52-62) processes *sequence states* on a *word* level to construct probable matches from acoustic scores while the prior art of Mizuta et al teaches *an HMM table; Viterbi processing and an output that provides a state sequence that maximizes a probability of identifying the spoken command* but on a *pattern, not polynomial*, basis, so the above underlined features are neither anticipated nor were they found in obvious combination in the prior art of reference.

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- Regarding claim 9, the closest prior art of Campbell et al⁶⁵³ discloses *averaging consecutive polynomial expansions* (column 7 lines 6-10 being *consecutive* by virtue of being created together) *after generating a polynomial expansion* (208 in figure 2).

The converse order of pre-processing in the application makes the feature of *averaging consecutive polynomial expansions prior to generating a polynomial expansion of the 1st* (non-training) *set of feature vectors* to be neither anticipated nor found in obvious combination in the prior art of record.

Conclusion

24. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Viterbi ("Wireless Communications for the Twenty-First Century", Asilomar Conference, November 1998) establishes spelling of subject's name.
- Assaleh et al (U.S. Patent 6,243,695 B1) access with tree-structure class modeling.
- Huang et al (U.S. Patent 5,937,384 A) recognition with continuous density HMM.
- Hon et al (U.S. Patent 5,963,903 A) dynamic training for speech recognition.
- Campbell (U.S. Patent 6,038,535 A) speech classification using delay elements.
- Mizuta et al (DERWENT account 1994-065240 week 199408) pattern representation model training apparatus for speech recognition - computing probability of vector sequence obtained from Hidden Markov Models for input vector.

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25. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Daniel A. Nolan at telephone (703) 305-1368 whose normal business hours are Mon, Tue, Thu & Fri, from 7 AM to 5 PM.

If attempts to contact the examiner by telephone are unsuccessful, supervisor Richemond Dorvil can be reached at (703)305-9645.

The fax phone number for Technology Center 2600 is (703)872-9314. Label informal and draft communications as "DRAFT" or "PROPOSED", & designate formal communications as "EXPEDITED PROCEDURE". Formal response to this action may be faxed according to the above instructions,

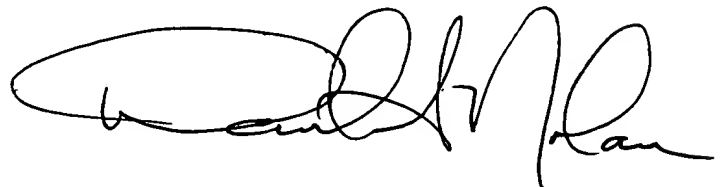
or mailed to: P.O. Box 1450
Alexandria, VA 22313-1450

or hand-deliver to: Crystal Park 2,
2121 Crystal Drive, Arlington, VA,
Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to Technology Center 2600 Customer Service Office at telephone number (703) 306-0377.

Daniel A. Nolan
Examiner
Art Unit 2654

DAN/d
February 5, 2004

A handwritten signature in black ink, appearing to read 'Daniel A. Nolan', with a large, stylized initial 'D'.

**DANIEL NOLAN
PATENT EXAMINER**